Eastern Equine Encephalitis (EEE) in Massachusetts

An Update for Health Care Providers

Massachusetts Department of Public Health (MDPH)
Division of Epidemiology and Immunization

Background

EEE is caused by the most neuropathogenic arbovirus transmitted in the United States. The mortality rate for those affected is high and survivors often suffer severe neurological damage. EEE is relatively rare, with 89 human cases reported in Massachusetts between 1938 and 2006. Over 60% of those cases have been from Plymouth and Norfolk counties. Outbreaks of EEE usually occur in Massachusetts every 10-20 years and typically last two to three years. The most recent outbreak of EEE began in 2004 and included 13 cases with six fatalities through 2006. The highest risk for EEE occurs from late July through September. People under 15 years of age or over 50 years of age are at greatest risk for serious illness.

EEE in Massachusetts by Year, 1938-2006

Years not shown had no reported cases

Year(s)	Number of Human Cases	Number of Deaths
1938-39	35	25
1955-56	16	9
1970	1	0
1973-75	6*	4
1982-84	10**	3
1990	3	1
1992	1	0
1995	1	1
1997	1	0
2000	1	0
2001	1	0
2004	4	2
2005	4	2
2006	5	2
TOTAL	**89**	**49**

* One case in 1973 consistent with exposure in NH
** One case in 1984 consistent with exposure in NJ

When to Suspect EEE

Central nervous system infection with EEE virus most commonly presents as encephalitis. The symptoms may present acutely or sub-acutely, but typically include fever, headache, alterations in level of consciousness, lethargy, confusion and seizures. Since encephalitis can coexist with inflammation of the meninges, symptoms of meningitis, such as headache and stiff neck, may predominate. **Suspect cases of encephalitis or meningitis, regardless of etiology, should be reported as soon as possible to the MDPH, Division of Epidemiology and Immunization, at 1-617-983-6800 or 1-888-658-2850.**

How to Test for EEE

In order to confirm suspect cases of EEE, it is vital that you send the appropriate samples to the MDPH State Laboratory Institute (SLI) for testing. See page two for further instructions.

Prevention Messages for Your Patients

- Schedule outdoor events to avoid the hours between dusk and dawn when mosquitoes are most active.
- When outdoors, wear long pants, a long-sleeved shirt and socks.
- Use a repellent with **DEET** (N, N-diethyl-m-toluamide), **permethrin, picaridin** (KBR 3023), or **oil of lemon eucalyptus** [p-methane 3, 8-diol (PMD)] according to the instructions on the product label. Review the MDPH Fact Sheet on Mosquito Repellents online at www.mass.gov/dph/cdc/factsheets/factsheets.htm or contact the MDPH at (617) 983-6800 for a hard copy.
- Keep mosquitoes out of the house by repairing any holes in screens and making sure they are tightly attached to all doors and windows.
- Remove areas of standing water around the home.

MDPH Arbovirus Website
www.mass.gov/dph/wnv/wnv1.htm

State Laboratory Institute
Diagnostic Testing for Arboviruses in Humans

Serologic tests and viral culture are available for diagnostic testing for evidence of infection with West Nile virus (WNV), eastern equine encephalitis (EEE) virus and other arboviruses. PCR is also available for detection of RNA of WNV and EEE virus. Multiple tests will be performed to identify viral infection and/or confirm exposure to virus. Testing may require that follow up (convalescent) specimens be submitted.

The following information is critical for accurate interpretation of test results:

- Date of onset of disease symptoms
- Date of specimen collection
- Unusual immunological status of patient (e.g. immunosuppression)
- Travel history (e.g., travel to flavivirus-endemic areas)
- Vaccination history (e.g., vaccination against yellow fever, Japanese encephalitis or Central European encephalitis)
- Disease history (e.g., previous history of viral encephalitis or dengue fever)
- Brief clinical summary including suspected diagnosis (e.g., encephalitis or meningitis)

Specimen types and amounts

Acute serum (≥ 3ml) and CSF (≥ 1ml) should be collected within the first 14 days following onset of symptoms and sent immediately to the State Laboratory. IgM antibody in serum is present in the majority of infected individuals by day 8, but may be present earlier. By 3 weeks after onset (often earlier), virtually all infected individuals will have IgG antibody by enzyme immunoassay (EIA) and plaque reduction neutralization assay (PRNT). In general, convalescent specimens should be drawn approximately 10-14 days after acute phase specimens.

CSF, brain and other tissues will be evaluated by cell culture and, if a sufficient specimen is available, by PCR. Specimens submitted for viral isolation within 48 hrs should be stored and shipped at 4°C. If already frozen, specimens should be shipped on dry ice.

Clinical specimens should be submitted using the State Laboratory Institute's clinical specimen submission form (SS-SL-1-05) (http://www.mass.gov/dph/bls/generalform.pdf). Additional arboviral information can be found on MDPH's arbovirus website (http://www.mass.gov/dph/wnv/wnv1.htm).

State Laboratory Institute

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